

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add device type 05. Paragraph 1.4; Correct Input Voltage Range from "+16 V dc to +40 V dc" to "+15 V dc to +50 V dc". Table IA V _{OUT} Load Regulation test; Correct max value from 100 mV for device type 01 and max value 120 mV for device type 02, 03 to max value of 50 mV for all device types. gjc	12-01-18	Charles F. Saffle
B	Case outline Y dimensioning table: Correct max inch dimension from ".335" to ".355" for symbol "A". Add Øb2 dimension for pin seal to case outlines X and Y. Editorial changes throughout. -gc	15-06-30	Charles F. Saffle

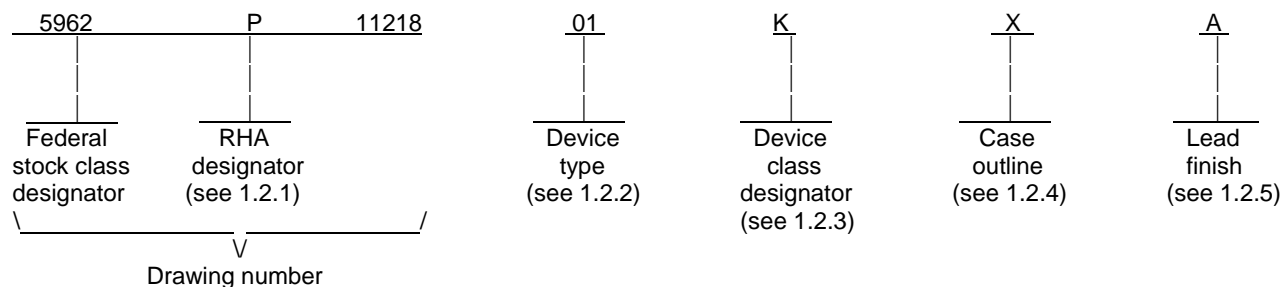


REV																						
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REV	B	B	B	B	B																	
SHEET	15	16	17	18	19																	
REV STATUS	REV			B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B			
OF SHEETS	SHEET			1	2	3	4	5	6	7	8	9	10	11	12	13	14					
PMIC N/A				PREPARED BY Greg Cecil				DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 http://www.landandmaritime.dla.mil/														
STANDARD MICROCIRCUIT DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A				CHECKED BY Greg Cecil																		
				APPROVED BY Charles F. Saffle				MICROCIRCUIT, HYBRID, LINEAR, SINGLE CHANNEL, DC-DC CONVERTER														
				DRAWING APPROVAL DATE 11-10-25																		
				REVISION LEVEL B				SIZE A	CAGE CODE 67268	5962-11218												
								SHEET 1 OF 19														

1. SCOPE

1.1 Scope. This drawing documents five product assurance classes as defined in paragraph 1.2.3 and MIL-PRF-38534. A choice of case outlines and lead finishes which are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of radiation hardness assurance levels are reflected in the PIN.

1.2 PIN. The PIN shall be as shown in the following example:



1.2.1 Radiation hardness assurance (RHA) designator. RHA marked devices meet the MIL-PRF-38534 specified RHA levels and are marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 Device type(s). The device type(s) identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	SVHF283R3S	DC-DC Converter, 10 W, +3.3 V Output
02	SVHF2805S	DC-DC Converter, 15 W, +5 V Output
03	SVHF2812S	DC-DC Converter, 20 W, +12 V Output
04	SVHF2815S	DC-DC Converter, 20 W, +15 V Output
05	SVHF282R5S	DC-DC Converter, 8 W, +2.5 V Output

1.2.3 Device class designator. This device class designator is a single letter identifying the product assurance level. All levels are defined by the requirements of MIL-PRF-38534 and require QML Certification as well as qualification (Class H, K, and E) or QML Listing (Class G and D). The product assurance levels are as follows:

<u>Device class</u>	<u>Device performance documentation</u>
K	Highest reliability class available. This level is intended for use in space applications.
H	Standard military quality class level. This level is intended for use in applications where non-space high reliability devices are required.
G	Reduced testing version of the standard military quality class. This level uses the Class H screening and In-Process Inspections with a possible limited temperature range, manufacturer specified incoming flow, and the manufacturer guarantees (but may not test) periodic and conformance inspections (Group A, B, C, and D).
E	Designates devices which are based upon one of the other classes (K, H, or G) with exception(s) taken to the requirements of that class. These exception(s) must be specified in the device acquisition document; therefore the acquisition document should be reviewed to ensure that the exception(s) taken will not adversely affect system performance.
D	Manufacturer specified quality class. Quality level is defined by the manufacturers internal, QML certified flow. This product may have a limited temperature range.

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1.2.4 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
X	See figure 1	8	Dual-in-line
Y	See figure 1	8	Dual-in-line, flange mount

1.2.5 Lead finish. The lead finish is as specified in MIL-PRF-38534.

1.3 Absolute maximum ratings. 1/

Input Voltage (Continuous)	+50 V dc
Input Voltage (Transient, 1 second)	+80 V dc
Power Dissipation (P _D , Full Load, T _{CASE} = +125°C)	6 W
Output Power (Dependent on Output Voltage)	20 W
Junction Temperature Rise to Case	+12 °C
Storage Temperature	-65 °C to +150 °C
Lead Solder Temperature (10 seconds)	+270 °C

1.4 Recommended operating conditions.

Input Voltage Range.....	+15 V dc to +50 V dc
Case Operating Temperature Range (T _C).....	-55 °C to +125 °C

1.5 Radiation features.

Maximum total dose available (dose rate = 30 - 300 rad(Si)/s)	30 krad (Si) 3/
Maximum total dose available (dose rate ≤ 10 mrad(Si)/s) LDR:.....	30 krad (Si) 3/ 4/
Components:	5/
Hybrid:.....	
Single event phenomenon (SEP) effective linear energy threshold (LET):	
SEL, SEB, SEGR, SEFI	≥44 MeV-cm ² /mg 2/ 6/

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38534 - Hybrid Microcircuits, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard for Electronic Component Case Outlines.

- 1/ Stresses above the absolute maximum ratings may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
- 2/ Single event performance is tested with minor transients only; no dropouts, shutdowns, latch up or burn out.
- 3/ Bipolar device types may degrade from displacement damage from radiation which could affect RHA levels. These device types have not been characterized for displacement damage.
- 4/ Components: The bipolar, BiCMOS linear and mixed signal semiconductor components have been tested to High Dose Rate (HDR) Condition C (30-300 rad(Si)/s) and Low Dose Rate (LDR) per condition D of MIL-STD-883, method 1019. The difference between HDR and LDR test results has been compared to determine if the semiconductors exhibit ELDRS effect. Low dose rate sensitivity was not demonstrated.
- 5/ Hybrid: Hybrid devices have been tested at HDR. LDR testing on the device has not been completed.
- 6/ See table IB.

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DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Copies of these documents are available online at <http://quicksearch.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM F1192 - Standard Guide for the Measurement of Single Event Phenomena (SEP) Induced by Heavy Ion Irradiation of Semiconductor Devices.

(Copies of these documents are available online at <http://www.astm.org/>)

2.3 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Item requirements. The individual item performance requirements for device classes D, E, G, H, and K shall be in accordance with MIL-PRF-38534. Compliance with MIL-PRF-38534 may include the performance of all tests herein or as designated in the device manufacturer's Quality Management (QM) plan or as designated for the applicable device class. The manufacturer may eliminate, modify or optimize the tests and inspections herein, however the performance requirements as defined in MIL-PRF-38534 shall be met for the applicable device class. In addition, the modification in the QM plan shall not affect the form, fit, or function of the device for the applicable device class.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 herein and figure 1.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.2.3 Radiation exposure circuit. The radiation exposure circuit shall be as specified on figure 3.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full specified operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are defined in table I.

3.5 Marking of device(s). Marking of device(s) shall be in accordance with MIL-PRF-38534. The device shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's vendor similar PIN may also be marked.

3.6 Data. In addition to the general performance requirements of MIL-PRF-38534, the manufacturer of the device described herein shall maintain the electrical test data (variables format) from the initial quality conformance inspection group A lot sample, for each device type listed herein. Also, the data should include a summary of all parameters manually tested, and for those which, if any, are guaranteed. This data shall be maintained under document revision level control by the manufacturer and be made available to the preparing activity (DLA Land and Maritime-VA) upon request.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to supply to this drawing. The certificate of compliance (original copy) submitted to DLA Land and Maritime-VA shall affirm that the manufacturer's product meets the performance requirements of MIL-PRF-38534 and herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38534 shall be provided with each lot of microcircuits delivered to this drawing.

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4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38534 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38534. The following additional criteria shall apply:

- a. Burn-in test, method 1015 of MIL-STD-883.
 - (1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DLA Land and Maritime-VA or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1015 of MIL-STD-883.
 - (2) T_A as specified in accordance with table I of method 1015 of MIL-STD-883.
- b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.
- c. PIND testing, method 2020, condition A, of MIL-STD-883.

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TABLE IA. Electrical performance characteristics.

Test	Symbol	Conditions <u>1/ 2/ 3/ 4/ 5/ 6/</u> -55°C ≤ T _C ≤ +125°C V _{IN} = +28 V dc ± 5% Full Load unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output Voltage	V _{OUT}	I _{OUT} = 3 A	1	01	3.267	3.333	V dc
			2,3		3.25	3.35	
			1,2,3 <u>7/</u>		3.244	3.35	
		I _{OUT} = 3 A	1	02	4.95	5.05	
			2,3		4.925	5.075	
			1,2,3 <u>7/</u>		4.89	5.10	
		I _{OUT} = 1.67 A	1	03	11.88	12.12	
			2,3		11.82	12.18	
			1,2,3 <u>7/</u>		11.66	12.3	
		I _{OUT} = 1.34 A	1	04	14.85	15.15	
			2,3		14.775	15.225	
			1,2,3 <u>7/</u>		14.565	15.4	
		I _{OUT} = 3.2 A	1	05	2.475	2.525	
			2,3		2.463	2.538	
			1,2,3 <u>7/</u>		2.463	2.538	
Output Current <u>8/ 9/</u>	I _{OUT}	V _{IN} = 15 V dc to 50 V dc	1,2,3	01,02		3	A
				03		1.67	
				04		1.34	
				05		3.2	
V _{OUT} Ripple Voltage	V _{RIP}	BW = 20 Hz to 10 MHz	1,2,3	All		40	mVp-p
V _{OUT} Line Regulation	V _{RLINE}	V _{IN} = 15 V dc to 50 V dc	1,2,3	All		20	mV
V _{OUT} Load Regulation	V _{RLOAD}	+V _{OUT} No Load to Full Load	1,2,3	All		50	mV
Input Current	I _{IN}	I _{OUT} = 0, Inhibit = 0	1,2,3	All		6	mA
		I _{OUT} = 0, Inhibit = open				65	
I _{IN} Ripple Current	I _{RIP}	BW = 20 Hz to 10 MHz	1,2,3	All		80	mAp-p
			1 <u>7/</u>			80	
			2,3 <u>7/</u>			110	

See footnotes at end of table.

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TABLE IA. Electrical performance characteristics - Continued.

Test	Symbol	Conditions <u>1/ 2/ 3/ 4/ 5/ 6/</u> -55°C ≤ T _C ≤ +125°C V _{IN} = +28 V dc ± 5% Full Load unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Efficiency	Eff	I _{OUT} = 3 A	1,2,3	01	65		%
		I _{OUT} = 3 A		02	72		
		I _{OUT} = 1.67 A		03	77		
		I _{OUT} = 1.34 A		04	78		
		I _{OUT} = 3.2 A		05	57		
Isolation	ISO	500 V dc, T _C = +25°C	1	All	100		MΩ
Capacitive Load <u>10/</u>	C _L	No effect on DC performance, T _C = +25°C	1	01,02, 05		1000	μF
				03,04		500	
Short Circuit Power Dissipation	P _D	Short Circuit	1,2,3	All		8	W
Switching Frequency	F _S		1,2,3	All	350	500	kHz
V _{OUT} Step Load Transient	V _{TLOAD}	50% Load to 100% Load	4,5,6	01		400	mV pk
				02		600	
				03,04		500	
				05		250	
V _{OUT} Step Load Transient Recovery <u>11/</u>	TT _{LOAD}	50% Load to 100% Load	4,5,6	01,03, 04		500	μs
				02, 05		600	
V _{OUT} Step Line Transient <u>10/</u>	V _{TLINE}	V _{IN} = 16 V dc to 40 V dc	4,5,6	01, 05		700	mV pk
				02		800	
				03,04		900	
V _{OUT} Step Line Transient Recovery <u>10/ 11/</u>	TT _{LINE}	V _{IN} = 16 V dc to 40 V dc	4,5,6	01,03, 04, 05		500	μs
				02		700	
Start Up Overshoot	V _{tonOS}	V _{IN} = 0 V dc to 28 V dc	4,5,6	01, 05		15	mV pk
				02		25	
				03,04		50	
Start Up Delay <u>11/</u>	Ton _D	V _{IN} = 0 V dc to 28 V dc	4,5,6	All		20	ms

See footnotes at end of table.

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- 1/ Half load at +V_{OUT} and half load at -V_{OUT}.
- 2/ End-of-Life performance meets standard datasheet limits unless specific End-of-life limits are given.
- 3/ Post irradiation testing shall be in accordance with 4.3.5 herein.
- 4/ The bipolar, BiCMOS linear and mixed signal semiconductor components have been tested to High Dose Rate (HDR) Condition C (30-300 rad(Si)/s) and Low Dose Rate (LDR) per condition D of MIL-STD-883, method 1019. The difference between HDR and LDR test results has been compared to determine if the semiconductors exhibit ELDRS effect. Low dose rate sensitivity was not demonstrated.
- 5/ Hybrid devices have been tested at HDR. LDR testing on the device has not been completed.
- 6/ RHA devices supplied to this drawing have been characterized through all levels M, D and P of irradiation. However, this device is tested only at the "P" level. Pre and Post irradiation values are identical unless otherwise specified in Table IA. When performing post irradiation electrical measurements for any RHA level, T_A = +25°C. See figure 3 for Total Ionizing Dose (TID) and Single Event Latch-up (SEL) test circuits.
- 7/ End-of-Life limits are not tested. These values are determined by worst case analysis and include radiation and aging factors.
- 8/ Derate linearly to 0 at 135°C.
- 9/ Up to 70 percent of the total power or current can be drawn from any one of the two outputs.
- 10/ Parameter shall be tested as part of device characterization and after design and process changes. Thereafter, parameters shall be guaranteed to the limits specified in table I.
- 11/ Time for V_{OUT} to settle within ±1 percent of its final value.

TABLE IB. SEP test limits. 1/

Device types	SEP	Temperature (T _C)	Effective linear energy transfer (LET)
01,02,03,04,05	SEL	+25°C	≥ 44 MeV-cm ² /mg
01,02,03,04,05	SEB	+25°C	≥ 44 MeV-cm ² /mg
01,02,03,04,05	SEGR	+25°C	≥ 44 MeV-cm ² /mg
01,02,03,04,05	SEFI	+25°C	≥ 44 MeV-cm ² /mg

1/ For SEP test conditions, see 4.3.5.1.1.3 herein.

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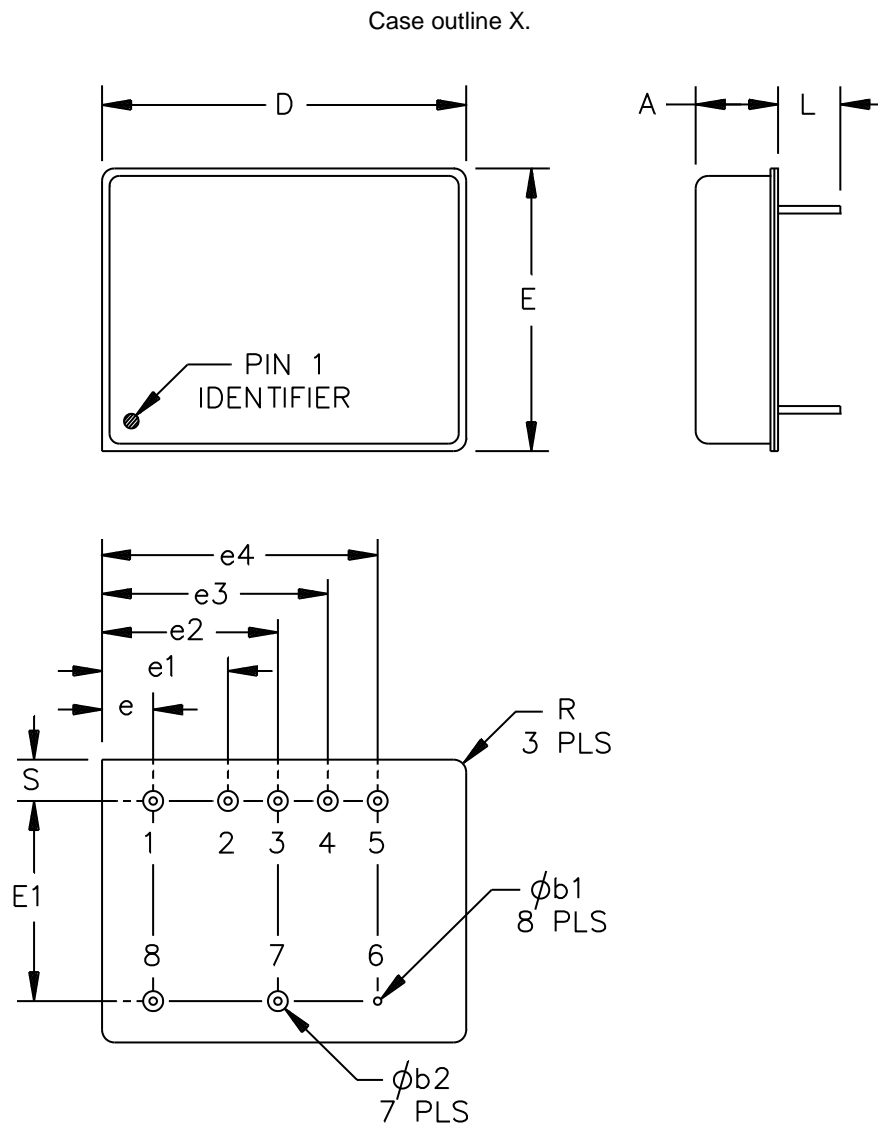


FIGURE 1. Case outline.

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Case outline X - Continued.

Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	-	8.38	-	.330
øb1	.71	.81	0.028	0.032
øb2	1.98	2.08	0.078	0.082
D	-	37.08	-	1.460
E	-	28.70	-	1.130
E1	20.19	20.45	.795	.805
e	5.08	5.33	.200	.210
e1	12.70	12.95	.500	.510
e2	17.78	18.03	.700	.710
e3	22.86	23.11	.900	.910
e4	27.94	28.19	1.10	1.11
L	5.97	6.73	.235	.265
R	1.14	1.40	.045	.055
S	3.94	4.19	.155	.165

NOTES:

1. The U. S. Government preferred system of measurement is the metric SI. This item was designed using inch-pound units of measurement. In case of problems involving conflicts between the metric and inch-pound units, the inch-pound units shall take precedence.
2. Pin numbers are for reference only.
3. Case outline X weight: 24 grams maximum.

FIGURE 1. Case outline – Continued.

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Case outline Y.

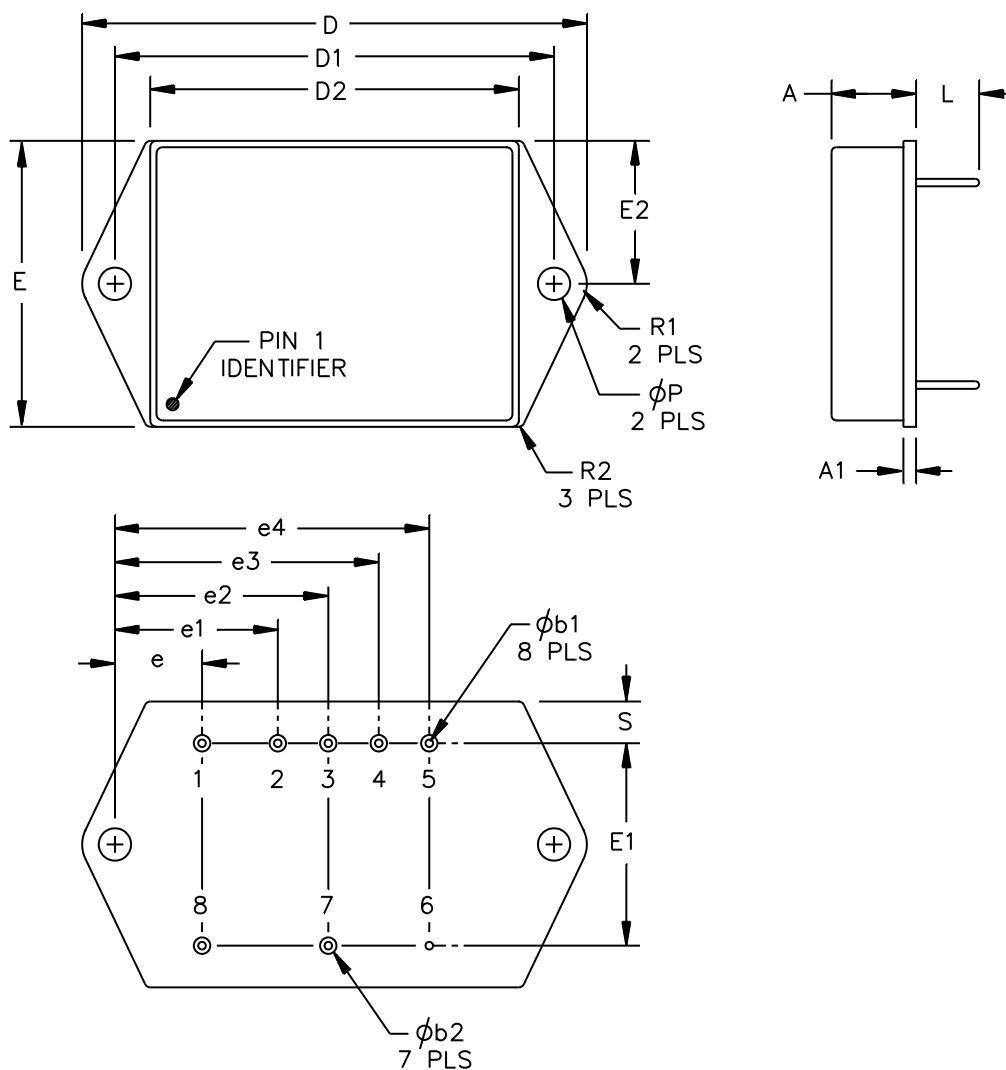


FIGURE 1. Case outline(s). – Continued

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Case outline Y - Continued.

Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	-	9.02	-	.355
A1	1.07	1.27	.042	.050
øb1	0.71	0.81	.028	.032
øb2	1.98	2.08	.078	.082
D	-	50.80	-	2.00
D1	43.82	44.07	1.725	1.735
D2	-	37.08	-	1.460
e	8.64	8.89	.340	.350
e1	16.26	16.51	.640	.650
e2	21.34	21.59	.840	.850
e3	26.42	26.67	1.040	1.050
e4	31.50	31.75	1.240	1.250
E	-	28.70	-	1.130
E1	20.19	20.45	.795	.805
E2	14.10	14.35	.555	.565
øP	3.12	3.38	.123	.133
L	5.97	6.73	.235	.265
R1	3.18	3.43	.125	.135
R2	1.14	1.40	.045	.055
S	3.94	4.19	.155	.165

NOTES:

1. The U. S. Government preferred system of measurement is the metric SI. This item was designed using inch-pound units of measurement. In case of problems involving conflicts between the metric and inch-pound units, the inch-pound units shall take precedence.
2. Pin numbers are for reference only.
3. Case outline Y weight: 27 grams maximum.

FIGURE 1. Case outline(s). - Continued

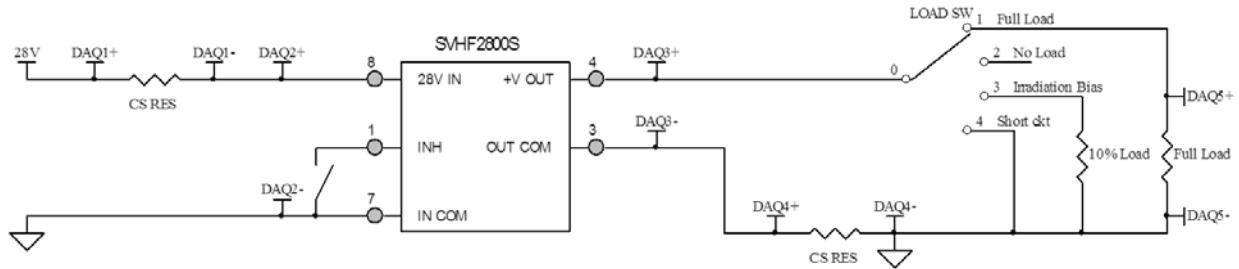
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Device types	All
Case outlines	X and Y
Terminal number	Terminal symbol
1	Inhibit
2	No connection
3	Output return
4	Output
5	No connection
6	Case ground
7	Input return
8	Input

FIGURE 2. Terminal connections.

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Total ionizing dose (TID)



Single Event Latch-up (SEL)

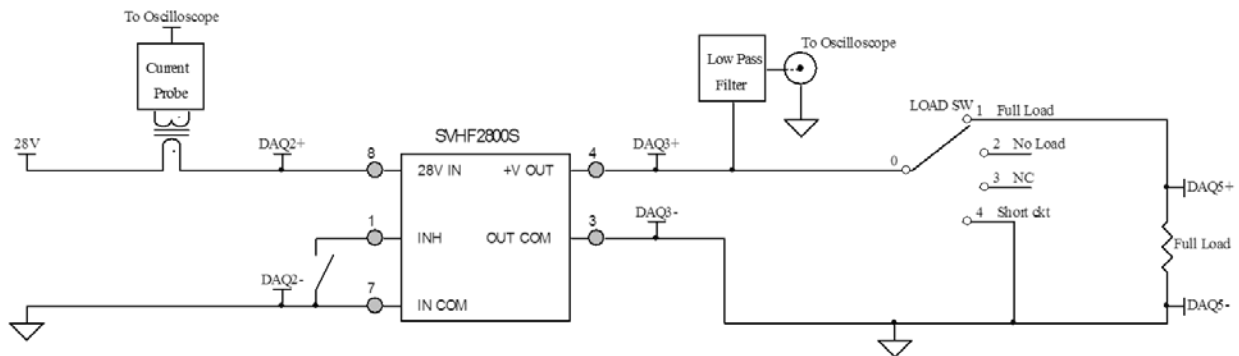


FIGURE 3. Radiation exposure circuits.

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TABLE II. Electrical test requirements.

MIL-PRF-38534 test requirements	Subgroups (in accordance with MIL-PRF-38534, group A test table)
Interim electrical parameters	1, 4
Final electrical parameters	1*, 2, 3, 4, 5, 6
Group A test requirements	1, 2, 3, 4, 5, 6
Group C end-point electrical parameters	1, 2, 3, 4, 5, 6
End-point electrical parameters for radiation hardness assurance (RHA) devices	1, 4

* PDA applies to subgroup 1.

4.3 Conformance and periodic inspections. Conformance inspection (CI) and periodic inspection (PI) shall be in accordance with MIL-PRF-38534 and as specified herein.

4.3.1 Group A inspection (CI). Group A inspection shall be in accordance with MIL-PRF-38534 and as follows:

- a. Tests shall be as specified in table II herein.
- b. Subgroups 7, 8, 9, 10, and 11 shall be omitted.

4.3.2 Group B inspection (PI). Group B inspection shall be in accordance with MIL-PRF-38534.

4.3.3 Group C inspection (PI). Group C inspection shall be in accordance with MIL-PRF-38534 and as follows:

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test, method 1005 of MIL-STD-883.
 - (1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DLA Land and Maritime-VA or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1005 of MIL-STD-883.
 - (2) T_A as specified in accordance with table I of method 1005 of MIL-STD-883.
 - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.3.4 Group D inspection (PI). Group D inspection shall be in accordance with MIL-PRF-38534.

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4.3.5. Radiation hardness assurance (RHA). RHA qualification is required only for those devices with the RHA designator as specified herein. See table IIIA and IIIB.

Table IIIA. Radiation Hardness Assurance Methods Table.

RHA method Employed	Active devices tested only as part of the hybrid device.	Testing at <u> 2 </u> X rated total dose		Worst Case Analysis <u> Yes </u> Performed				End points after dose is achieved includes minimum maximum, and room temperatures	
		Element Level	Hybrid Device Level	Includes temperature effects	Combines temperature and radiation effects	Combines total dose and displacement effects	End-of-life	Element Level	Hybrid device level
	No	Yes	Yes	Yes	Yes	No	Yes	No	No

Table IIIB. Hybrid level and element level test table.

VPT SVHF SMD 5962-11218	Radiation Test								
	Total Dose			Heavy Ion		Proton		Neutron	
Hybrid Level Testing	Low Dose Rate	High Dose Rate (HDR)	ELDRS Characterization	SEU (upset)	SEL (latch-up)	Low Energy	High Energy	SEE (upset)	Displacement Damage (DD)
	X (60 krad)	X (60 krad)	(N)	X(44 MeV-cm ² /mg)	X(44 MeV-cm ² /mg)	(N)	(N)	(N)	(N)
Element Level Testing									
CMOS Discrete (Power MOSFET)	N/A	X (60 krad)	N/A	X (hybrid level test)	X (hybrid level test)	(N)	(N)	(N)	(N)
Bipolar Discrete Devices	(N)	X (60 krad)	(N)	X (hybrid level test)	X (hybrid level test)	(N)	(N)	(N)	(N)
Bipolar Linear or Mixed Signal > 90 nm	X (60 krad)	X (60 krad)	X	X (hybrid level test)	X (hybrid level test)	(N)	(N)	(N)	(N)

See notes at end of table.

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Table IIIB. Hybrid level and element level test table. – Continued.

VPT SVHF	Radiation Test		
SMD 5962-11218	Prompt Dose		
Hybrid Level Testing	DRU (upset)	DRL (latch)	Parametric (survive)
	(N)	(N)	(N)
Element Level Testing			
CMOS Discrete (Power MOSFET)	(N)	(N)	(N)
Bipolar Discrete Devices	(N)	(N)	(N)
Bipolar Linear or Mixed Signal > 90 nm	(N)	(N)	(N)

NOTES:

X = Radiation Testing Done Level

G = Device Mfr Guaranteed (QML-V or Class S)

(N) = Not yet tested

N/A = Not Applicable

P = Program-Specific testing

4.3.5.1 Radiation Hardness Assurance (RHA) inspection. RHA qualification is required for those devices with the RHA designator as specified herein. End-point electrical parameters for radiation hardness assurance (RHA) devices shall be specified in table II. Radiation testing will be in accordance with the qualifying activity DLA Land and Maritime-VQ approved plan and with MIL-PRF-38534, Appendix G.

- a. The hybrid device manufacturer shall establish procedures controlling component radiation testing, and shall establish radiation test plans used to implement component lot qualification during procurement. Test plans and test reports shall be filed and controlled in accordance with the manufacturer's configuration management system.
- b. The hybrid device manufacturer shall designate a RHA program manager to oversee component lot qualification, and to monitor design changes for continued compliance to RHA requirements.

4.3.5.1.1 Hybrid level qualification.

4.3.5.1.1.1 Qualification by similarity. A family is defined by the family model designator e.g. SVFL single/dual. All parts with this designator share a common design and use the same active elements. Device type 5962P1121802HXC was tested and all other devices on this SMD are qualified by similarity.

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4.3.5.1.1.2 Total ionizing dose irradiation testing. A minimum of one representative hybrid of the hybrid family (family model designator, e.g. SVFL Single/Dual) is initially characterized and tested and after any design or process changes which may affect the RHA response of the device type. Devices are tested at High Dose Rate (HDR) in accordance with condition C (dose rate of 30-300 rad(Si)/s) of method 1019 of MIL-STD-883, as well as at Low Dose Rate (LDR) in accordance with condition D of method 1019 of MIL-STD-883. Differences between HDR and LDR tests results are compared to determine if the parts exhibit ELDRS effects. Total ionizing dose is tested to 60 krad (Si) and characterized to ensure 30 krad (Si) by 2 times the rated value. A minimum of 1 biased sample for HDR and LDR and 1 unbiased sample for HDR and LDR will be tested.

4.3.5.1.1.3 Single event phenomena (SEP). A minimum of one representative hybrid of the hybrid family is characterized for SEE response at initial qualification and after any design or process changes which may affect the RHA response of the device type. Testing shall be performed in accordance with ASTM F1192. Test conditions for SEP are as follows:

- a. The ion beam angle of incidence shall be normal to the die surface. No shadowing of the ion beam due to fixturing is allowed.
- b. The fluence shall be $\geq 1 \times 10^6$ particles/cm².
- c. The flux shall be between 10^2 and 10^5 ions/cm²/s.
- d. The particle range shall be ≥ 35 micron in silicon.
- e. The characterization is performed at nominal input voltage, and the test temperature shall be 25°C \pm 10°C in air.
- f. For SEP test limits, see table IB herein.

4.3.5.1.2 Component level qualification.

4.3.5.1.2.1 Total Ionizing Dose Irradiation. Testing every initial wafer lot of bipolar / BiCMOS linear or mixed signal semiconductor components will be characterized and tested at HDR in accordance with condition C (dose rate of 30-300 rad(Si)/s) of method 1019 of MIL-STD-883, as well as at LDR in accordance with condition D of method 1019 of MIL-STD-883. Differences between HDR and LDR tests results are compared to determine if the parts exhibit ELDRS effects. A minimum of 10 samples for HDR (5 biased and 5 unbiased) and 10 samples for LDR (5 biased and 5 unbiased) will be tested. If a specific component type is determined to exhibit ELDRS, all future wafer lots of that specific component will be tested at LDR.

4.3.5.2 Lot Acceptance. Each lot of active elements shall be evaluated for acceptance in accordance with MIL-PRF-38534 and herein.

4.3.5.2.1 Total Ionizing Dose. Every wafer lot of all critical semiconductor components will be RLAT (Radiation Lot Acceptance Testing) tested at HDR in accordance with condition C (dose rate of 30-300 rad(Si)/s) of method 1019 of MIL-STD-883. A minimum of 5 biased samples and 5 unbiased samples will be tested. 0.9900/90% statistics are applied to the device parameter degradations which are compared against established limits for lot acceptance. Low dose rate will be used in lieu of HDR for parts that exhibit ELDRS effects or for which ELDRS evaluation per test method 1019 MIL-STD-883 is not available.

4.3.5.2.2 Technologies not being tested. Testing is not performed on device technologies including: P/N, Schottky and zener diodes, and on small signal bipolar junction transistors that the manufacturer considers to be radiation hardened.

4.3.5.2.3 Performance requirements. As an alternative to testing, components may be procured to manufacturer radiation guarantees that meet the minimum performance requirements. Component radiation performance guarantees shall be established in compliance with MIL-PRF-19500, Group D or MIL-PRF-38535, Group E, as applicable.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38534.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

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6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated as specified in MIL-PRF-38534.

6.4 Record of users. Military and industrial users should inform DLA Land and Maritime when a system application requires configuration control and the applicable SMD. DLA Land and Maritime will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DLA Land and Maritime-VA, telephone (614) 692-0547.

6.5 Comments. Comments on this drawing should be directed to DLA Land and Maritime-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-1081.

6.6 Sources of supply. Sources of supply are listed in MIL-HDBK-103 and QML-38534. The vendors listed in MIL-HDBK-103 and QML-38534 have submitted a certificate of compliance (see 3.7 herein) to DLA Land and Maritime-VA and have agreed to this drawing.

6.7 Additional information. When applicable, a copy of the following additional data shall be maintained and available from the device manufacturer:

- a. RHA upset levels.
- b. Test conditions (SEP).
- c. Occurrence of latchup (SEL).
- d. Occurrence of Burn-out (SEB).
- e. Occurrence of Gate Rupture (SEGR).
- f. Occurrence of Single Event Functional Interrupt (SEFI).

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STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 15-06-30

Approved sources of supply for SMD 5962-11218 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38534 during the next revisions. MIL-HDBK-103 and QML-38534 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DLA Land and Maritime-VA. This information bulletin is superseded by the next dated revisions of MIL-HDBK-103 and QML-38534. DLA Land and Maritime maintains an online database of all current sources of supply at <http://www.landandmaritime.dla.mil/Programs/Smcr/>.

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
5962P1121801HXC 5962P1121801HXA 5962P1121801HYC 5962P1121801HYA 5962P1121801KXC 5962P1121801KXA 5962P1121801KYC 5962P1121801KYA	0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6	SVHF283R3S/H+ SVHF283R3S/H+-E SVHF283R3SF/H+ SVHF283R3SF/H+-E SVHF283R3S/K SVHF283R3S/K-E SVHF283R3SF/K SVHF283R3SF/K-E
5962P1121802HXC 5962P1121802HXA 5962P1121802HYC 5962P1121802HYA 5962P1121802KXC 5962P1121802KXA 5962P1121802KYC 5962P1121802KYA	0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6	SVHF2805S/H+ SVHF2805S/H+-E SVHF2805SF/H+ SVHF2805SF/H+-E SVHF2805S/K SVHF2805S/K-E SVHF2805SF/K SVHF2805SF/K-E
5962P1121803HXC 5962P1121803HXA 5962P1121803HYC 5962P1121803HYA 5962P1121803KXC 5962P1121803KXA 5962P1121803KYC 5962P1121803KYA	0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6	SVHF2812S/H+ SVHF2812S/H+-E SVHF2812SF/H+ SVHF2812SF/H+-E SVHF2812S/K SVHF2812S/K-E SVHF2812SF/K SVHF2812SF/K-E
5962P1121804HXC 5962P1121804HXA 5962P1121804HYC 5962P1121804HYA 5962P1121804KXC 5962P1121804KXA 5962P1121804KYC 5962P1121804KYA	0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6 0ZBZ6	SVHF2815S/H+ SVHF2815S/H+-E SVHF2815SF/H+ SVHF2815SF/H+-E SVHF2815S/K SVHF2815S/K-E SVHF2815SF/K SVHF2815SF/K-E

STANDARD MICROCIRCUIT DRAWING BULLETIN - Continued

DATE: 15-06-30

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962P1121805HXC	0ZBZ6	SVHF282R5S/H+
5962P1121805HXA	0ZBZ6	SVHF282R5S/H+-E
5962P1121805HYC	0ZBZ6	SVHF282R5SF/H+
5962P1121805HYA	0ZBZ6	SVHF282R5SF/H+-E
5962P1121805KXC	0ZBZ6	SVHF282R5S/K
5962P1121805KXA	0ZBZ6	SVHF282R5S/K-E
5962P1121805KYC	0ZBZ6	SVHF282R5SF/K
5962P1121805KYA	0ZBZ6	SVHF282R5SF/K-E

- 1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the Vendor to determine its availability.
- 2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE
number

0ZBZ6

Vendor name
and address

VPT Incorporated
1971 Kraft Drive, Suite 1000
Blacksburg, VA 24060

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